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ABSTRACT

A method using estimates of individual time allocations was developed to produce a profile of departmental functioning as a whole. Previous research suggested that staff estimates were a reasonably accurate and economical method for obtaining estimates of time. Each staff member estimated the percentage of his or her time spent on different tasks during the 1975-76 fiscal year, using a set of generic categories of services of the division. Administrators' estimates of each staff member's activities were compared for differences in perceptions. Most differences could be attributed to either differences in the interpretation of categories or in styles of estimation. Profiles of services were prepared, reporting the percentage of total staff time and in terms of dollar costs, using estimates weighted with actual amounts attributable to individuals. The method provided information on the actual allocation of time and budgeted funds for individuals and for the division. Plans for improving the data collection and the reliability of the estimates are discussed. (Author/JG)

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ESTIMATING COSTS OF SERVICES AND RESOURCE ALLOCATIONS USING SELF REPORTS OF TIME PROPORTIONS

A paper prepared for presentation at the

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MEETING OF CALIFORNIA EDUCATIONAL RESEARCH ASSOCIATION

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ABSTRACT

A method using estimates of individual time allocations was developed to produce a profile of departmental functioning as a whole. The Division of Program Evaluation, Research, and Pupil Services of the Los Angeles County Superintendent of Schools has a staff of two administrators, twenty credentialed consultants, two psychologists, six technical staff members and seventeen secretarial and clerical personnel. The wide range of services provided by the Division, the overlap of individual assignments into several areas, and increasing flexibility of staff utilization made it increasingly difficult to gain current information concerning actual allocations of staff time or funds by program categories. Requests for new services, evaluation of present activities, and an increasing concern for budgetary planning made information on allocations of resources or costs by type of service increasingly important. Previous research suggested that staff estimates were a reasonably accurate and economical method for obtaining estimates of time.

Each staff member estimated the percentage of his or her time spent during the 1975-76 fiscal year based on a set of generic categories of services of the Division. Administrators' estimates of each staff member's activities were compared for differences in perceptions. Most of the differences could be attributed to either differences in the interpretation of the categories or in styles of estimation. Major differences in perceptions will be used as a point of discussion during personnel conferences.

Profiles of services were prepared reporting the percentage of total staff time and in terms of dollar costs using estimates weighted with actual amounts attributable to individuals. The method provided information on the actual allocation of time and budgeted funds for individuals and the Division. Plans for improving the data collection and the reliability of the estimates are discussed.

In a service oriented organization where the size of the staff is large and the number and types of services varies, a clear description of personnel or financial resources allocation may be difficult. Basic costs are often identified as personnel, equipment, reproduction or others, but attribution of these costs to specific services becomes difficult or overly time-consuming where many services are provided by a variety of people with overlapping responsibilities. As a result, an administrator in such an organization may not have the information available for as clear a picture of current allocations as would be liked. In an attempt to derive such information for one division of a county schools office, a method using estimates of individual time allocation was developed to produce a profile of division functioning as a whole.

The Division of Program Evaluation Research, and Pupil Services of the Los Angeles County Superintendent of Schools provides assistance to school districts in Los Angeles County in certain specified field. To do so, a staff of twenty credentialed consultants provides advice and direct assistance upon request and in response to observed or predicted needs. Services are provided through consultations, workshops, seminars, conferences, publications or any other medium which seems appropriate. The consultant staff is supported by seventeen clerical and secretarial personnel and a six-member technical staff. In addition, two school psychologists provide psychological assistance to certain small districts in the county. A Director and an Assistant Director are responsible for the administration of the Division.

The majority of the work done by consultants is independent of constant supervision once specific assignments are made by the administrators. Although decisions are reviewed, consultants enjoy considerable freedom to develop programs within the structure of program objectives and keep their own schedules or appointments. Further, a few consultants deal with only one area of expertise, but as a matter of policy are commonly involved in all of the Division's assigned functions. A single, categorical description of time or personnel allocation for the Division is not readily available in a quantifiable form even though each staff member provides a monthly summary of activities by function but not by program or time spent.

A few studies have shown that personnel estimates of time spent in job duties correlated moderately well with estimates based on work sampling. Apparently, specific duties like typing, report writing or equipment operation can be estimated more accurately than activities like planning or reflection (Carroll and Taylor, 1969; Hinrichs, 1964; Mahoney, Jerdee, and Carroll, 1963; Stogdill and Shartle, 1955). In the present instance, an estimate of the generic activities of the Division was desired; the kinds of activities were those commonly considered representative of the services of the Division. Work sampling data was not possible and despite the general nature of the activities which were of interest, the only method which seemed open was the use of estimates by the persons doing the work. The decision was made that some information by program was better than only information by function or task. The method used in obtaining the estimates constitutes a pilot investigation from which a more accurate procedure may be developed.

Among the assumptions which were necessary were the following: 1) personnel could remember general activities better than specifics over the period in question or one year, 2) analysis based on a combination of several estimates by personnel would be more accurate than an estimate by the administrator, 3) styles of estimation would not be so different as to affect the combined results, and 4) if administrators and staff agreed within bounds on individual estimates then the estimate was a reasonable representation of actual time spent.

METHOD

Each consultant, technical, and administrative staff member for which a budgeted salary was available estimated the percentage of his or her time spent in certain activities. A standard list of activities was compiled on the basis of the programs and objectives which had been defined by the staff in previous years. Each member of the secretarial staff estimated the percentage of her time spent for each staff member assignment (one secretary being assigned to one or more staff members). Figure 1 and Figure 2 are examples of the two forms used to collect staff and secretarial estimates.

An estimate of the dollar value of services rendered required that an amount equal to the salary, benefits and incidental expenses associated with each of twenty-six staff members be derived. Two steps were required: 1) based on Division records, the expenses for mileage reimbursement and conference attendance were added to the budgeted salary and attendant benefits amounts for each staff member, and 2) the percentage of the budgeted salary and benefits for each secretary was added to the total for the appropriate, assigned staff member on the basis of the secretary's estimate of time spent for each. The resulting individual totals included staff member and secretarial salary and benefits and mileage and conference expenses. Inclusion of certain expenses not assignable to individuals, e.g., copying and equipment, and special project funds with the total of the individual amounts brought the estimate to within 2% of the actual Division budget. Budgeted amounts were used despite the problem of inflation of the estimates of the dollars spent in order to avoid dealing with the personnel records. Also, reporting the results as a percentage of the budget seemed more reasonable in as much as the data would be primarily used in budgeting decisions.

FIGURE 1

NAME

DIVISION OF PROGRAM EVALUATION, RESEARCH, AND PUPIL SERVICES

ACTIVITIES SUMMARY
Consultant, Administrative, and Technical Staff

Instructions: First, make a mark next to each activity in which you were involved during the fiscal year 1975-1976. Then for each one marked, estimate the percentage of your time spent on each activity. Try to be as accurate as possible, knowing that many numbers will reflect estimates rather than exact figures. Have the percentages total to 100%. You may need to readjust your estimates until they do.

Example:

VIEW	90
Other (Specify:) proposal writing (special project)	10
TOTAL	100 %

Check *****	Activity ********	Percentage **********
_____	AFDC	_____
_____	A-127, E-127	_____
_____	Audit	_____
_____	Coordination with State Department	_____
_____	Counseling and Guidance	_____
_____	Data Base	_____
_____	Data Processing	_____
_____	Direct Services	_____
_____	Division Administration	_____
_____	Division Publications	_____
_____	Evaluation	_____
_____	EIP	_____
_____	Gifted	_____
_____	Health	_____
_____	Interdivisional Committees	_____
_____	Journal Publications	_____
_____	LANCERS	_____
_____	Professional Organizations	_____
_____	Pupil Services	_____
_____	Research	_____
_____	Social Activities	_____
_____	State Assessment	_____
_____	Statistical Analysis	_____
_____	Test/Testing	_____
_____	VIEW	_____
_____	Other (specify	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
	TOTAL	%

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FIGURE 2

NAME

DIVISION OF PROGRAM EVALUATION, RESEARCH, AND PUPIL SERVICES

ACTIVITIES SUMMARY
Classified Staff, Non-technical

Instructions: First, list each person for whom you act as a secretary or clerk or to whom you are responsible as well as any activities which do not correspond to a specific person (such as Division Monthly Report, Budget, Mail, Newsletter, etc.). Then estimate the percentage of the time you spent during the 1975-1976 fiscal year for each item you list. Try to be as accurate as possible, knowing that many numbers will reflect estimates rather than exact figures. If you add all the percentages together, they should total to 100%. If they do not, please readjust your estimates until they do.

Example:

Warren Newman	90
Annual Report	10
TOTAL	100 %

Consultant/Administrator/ Technical Staff	Percentage
**********	**********
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Other Activities (Specify)	
**********	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
TOTAL	%

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Data Analysis:

Staff time spent. The data were compiled by program or activity by summing each individual percentage reduced to a proportion of time spent on each activity during one year:

$$ET_j = \sum_{i=1}^{n} E_{ij}$$

where ET_j is estimated time in years for the $_j$th activity and E_{ij} is the decimal fraction estimate of the time of the $_i$th individual for the $_j$th activity. The proportion of total time spent by the entire staff on an activity was obtained by dividing the total for each activity by the total number of years (one year times the number of individuals (N=26)):

$$\overline{ET}_j = ET_j/N$$

where $\overline{ET}_j$ is the proportion of time spent in one year for the $_j$th activity by all of the staff combined. The percentage is the proportion multiplied by 100%.

Total Division resources spent. The data were compiled by weighting the estimate of each individual for each activity by the number of dollars associated with each individual. The formula was:

$$ER_j = \sum_{i=1}^{n} E_{ij} w_i$$

where ER is the estimated resources spent in the $_j$th activity and w_i is the dollar amount of the $_i$th individual. The proportion of the total was obtained by dividing the estimated resources for each activity by the total number of dollars ($T = \sum_{i=1}^{n} w_i$). The formula was:

$$ER_j = \frac{\overline{ER}_j}{T} = \Sigma E_{ij} w_i \Big/ \Sigma w_i$$

The percentage is the proportion times 100%.

Division Budget. In order to provide a profile which approximated the budgeted resources of the Division, the totals, ER_j, were combined with special budget amounts and expenses which were not assignable to individual members. Thus, the total number of dollars was increased, and certain activities were weighted with dollar amounts budgeted specifically for certain programs. In effect, ER_j is an estimate of expenses based primarily on individual staff members, and the latter is an estimate based on total Division resources or budgeting.

Administrator estimates. The Director and Assistant Director, respectively A and B in the Tables, separately estimated the time allocations for each staff member using the same list of activities as the staff. Neither were provided with information about which activities or categories were actually reported by any staff member. Consequently, a comparison of administrator estimates with those of each staff member was intended to provide some evidence concerning differences of perceptions and to act as difficult measure, in fact.

Analysis of the data was primarily concerned with differences. The administrator's estimate of an activity for a staff member was subtracted from the staff member's estimate. A negative difference constituted an overestimation, and a positive difference constituted an underestimation. Whenever a staff member had not made an estimate and an administrator had or vice-versa, the procedure was still applied with one or the other estimate equal to zero. The sum of the differences equals zero, but the absolute value of the sum of either the positive or the negative difference constitutes the total percentage in disagreement. Two methods were used to describe the results of the comparison: 1) the absolute value of the sum of the positive differences constitutes the total measure of

disagreement, and 2) the distribution of the differences constitutes the measure of the size and type of individual errors or differences between estimates on each activity.

A profile of the proportion of the year spent in Division activities was prepared using staff estimates of time, and a similar profile was developed based on the Director's estimates for each member of the staff. The same procedure was used except that the Director's estimate of his own time was retained to keep the "N's" equal. Keeping in mind that the Director's estimate was used in both profiles, a Spearman rank difference correlation was calculated for the correlation between the two profiles.

RESULTS

Time Proportions

Individual estimates appeared to be reasonable after discussions between a sample of the respondents and the administrators. However, ommissions and misinterpretation of some of the categories were identified which suggest that further investigation of the techniqua is necessary. (Table 1)

Time and Dollars Allocated

Analysis showed that a percentage of 3.8 points constituted one person working full-time at an activity for the year. Inspection of the profile of time allocations seemed to find results which were in agreement with certain well defined personnel assignments. This finding lends support to the use of the technique.

A comparison of the profile for time allocations with the profile weighted by the dollar value of personnel, including secretarial, identified differences in allocations attributable to the combined effect of 1) salary differentials and 2) secretarial support. Since the differences were due to changes in weights the two profiles correlated .84 (Spearman rho).

Total Budget Allocations

An estimate of budget allocation was prepared by using first the initial Budget Summary used for planning, and second, the total Final Budget for the fiscal year. The allocations were reported as a percentage of the total and as minor, intermediate, and major total percentages. Percentages were reported for budgeted amounts which were separate from amounts developed from staff estimates. The

TABLE I

ACTIVITIES ESTIMATION

Comparison of Allocation Using
Budget Amounts to Allocation Based on Time

	Dollars Allocated	Time Allocated
1. Evaluation	16.7%	17.7%
2. Audit	9.3	9.8
3. Division Administration	7.6	3.0
4. Pupil Services	7.1	8.1
5. Consultant on Loan	6.2	7.7
6. Counseling and Guidance	4.8	3.3
7. A-127, E-127	4.7	4.4
8. Professional Organizations	4.2	2.7
9. Gifted	3.9	3.2
10. EIP	3.4	3.0
11. LANCERS	3.3	5.4
12. Statistical Analysis	2.9	3.8
13. AFDC	2.8	4.1
14. Interdivisional Committees	2.8	3.5
15. Other (Unassignable)	2.8	0.8
16. Research	2.6	2.5
17. Testing	2.2	3.0
18. VIEW	2.1	1.6
19. Health	2.1	3.6
20. Coordination with State	1.9	2.1
21. Division Publications	1.6	1.6
22. Data Processing	1.2	1.3
23. State Assessment	1.0	1.0
24. Data Base	1.0	0.9
25. Direct Services	0.7	0.6
26. Journal Publications	0.6	0.6
27. Social Activities	0.5	0.7

results were in line with administrator expectations, but there were a few informative differences as well.

Administrator versus Staff Estimates

Administrators produced estimates which deviated from the total for any individual by as little as 3% and as much as 50%. (Table 2). Both administrators made their most accurate estimates for the same staff member whose range of duties were most strictly defined. The most common error resulted from estimating differently for two similar activities, Pupil Services or Counseling and Guidance. The other major cause of difference was the choice of activity. In some cases, estimates were not made even though such work had been done. The reliability of both size of estimate and choice of category was not determined.

Both administrators made 70-80% of their errors for individual estimates in the range of ±5%. The Director made somewhat better estimates, but the difference appeared to be inflated by the choices and numbers of categories. Since both administrators were not informed as to the appropriate categories for each member, they made estimates for more activities than reported by the staff members. The profile of total staff time allocation developed from the Director's estimates correlated 0.84 (Spearman rho) with the profile based on actual estimates by the staff. The Director did not make a separate estimate of Division allocations, but such an estimate based on his perception of individual activities did agree relatively well with actual allocations.

TABLE 2

Sample Data Analysis Sheet Used to
Compare Administrator Estimates
with a Staff Member Estimate

ACTIVITY	Staff Members A			Administrators B	
	%	%	Diff.	%	Diff.
AFDC					
A-127, E-127		4	- 4		
Audit	35	53	-18	38	- 3
Coordination with State Department					
Counseling and Guidance		2	- 2		
Data Base					
Data Processing					
Direct Services					
Division Administration					
Division Publications					
Evaluation	35	15	20	38	- 3
EIP					
Gifted					
Health					
Interdivisional Committees	10.5	9	1.5	15	- 4.5
Journal Publications					
LANCERS					
Professional Organizations	9.5	10	- 0.5	5	4.5
Pupil Services		2	- 2	3	- 3
Research					
Social Activities				1	- 1
State Assessment					
Statistical Analysis		3	- 3		
Test/Testing		2	- 2		
VIEW					
Other (specify)					
Teaching as a Performing Art	10		10		10
Total			31.5%		14.5%

BJ/cr

DISCUSSION

The use of staff estimates of personnel time allocations to develop a profile of organizational allocation of time and funds appears to be both inexpensive and relatively accurate. The accuracy of the method is still open to further investigation, but the results of this study suggests that there was some agreement with reality.

The method provided information which was not quantifiable previously. Estimates of costs and time by programmatic category were obtained without resorting to costly work sampling techniques. Further, the data provided information to administrators concerning individual allocations and deviations from administrators' perceptions.

The validity of the conclusions must stand on inspection due to the cost of determining or obtaining actual time and cost amounts. The determination of the reliability of estimates requires more study. There were individual differences in assigning meaning to the categories and the ability to remember the types of work done during the year. Finally, the reliability of the actual estimates was not established.

Further use of the method would seem appropriate, but several improvements are necessary. Care must be taken that the activities or categories are clearly understood and have similar meaning for all respondents. Respondents should be given some training or practice in time estimation or some type of anchor, such as 10% = 1 week, should be provided so that all estimates have a common basis. The

period of interest should be defined so that it is not too long or so short that the results are meaningless. The longer the period the more likely the results will be affected by the memory of the respondents. The weights chosen to develop dollar costs should relate to the use that will be made by the administrator. In some cases, exact dollar amounts will be necessary rather than the budgeted, somewhat inflated amounts used for this study. Finally, a decision must be made concerning any study of administrator perceptions. The present study was interested in differences in individual perceptions and did not provide administrarors with information concerning the appropriate categories for estimates. With such information, a different type of analysis of the errors would be possible.

Personal estimates can be useful for collecting information under a variety of conditions and for any number or types of activities. Care must be taken in drawing conclusions, but the method is inexpensive and in this study, provided information which was not obtainable by any other method.

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